



Lagoon



Aerated influent end of wetland



Effluent end of wetland cell



Vista down wetland cells

Avondale Facility Statistics

Nearest Town:	Ouray
County:	Ouray
River Basin:	Uncompahgre River
Receiving Water Body:	Uncompahgre River
Year Online:	1995
Population:	700 (winter) 2000 (summer)
Elevation (feet):	7700
Design Flow (mgd):	0.363
Average Flow (mgd):	0.26
Size (acres):	0.76

Facility Description

The Ouray wastewater treatment facility is a domestic minor municipal lagoon system. This new facility consists of headworks with a bar screen, a Parshall flume, a grit channel, and an influent lift station followed

by two aerated lagoons, a wetlands system for polishing, an effluent Parshall flume, hypochlorination, a chlorine contact chamber, and dechlorination prior to discharge to the Uncompahgre River.

Lagoons

The Ouray lagoon system consist of 2 cells operated in series. Multiple take-off elevations are provided for the effluent from cell 2. The table below discusses some of the lagoon features.

Lagoon Information		
Cell No.:	1	2
Surface Area (sq. ft.)	18,880	16,920
Avg. Depth (ft)	14.8	14.3
Avg. Volume (Million gallons)	2.09	1.81
Detention time (days)	5.8 - 8.4	5.0 - 7.2
Aerator size (hp)	30	15

Background Information

The City's main collection system was constructed in the early 1900's as a combination groundwater, storm sewer, and sanitary sewer with a direct discharge to the river. Ouray's first treatment system was built in 1969 as an activated sludge wastewater system. An aerated lagoon was added in 1976. In 1989 a 201 Facility Study suggested that a new aerated lagoon system be constructed.

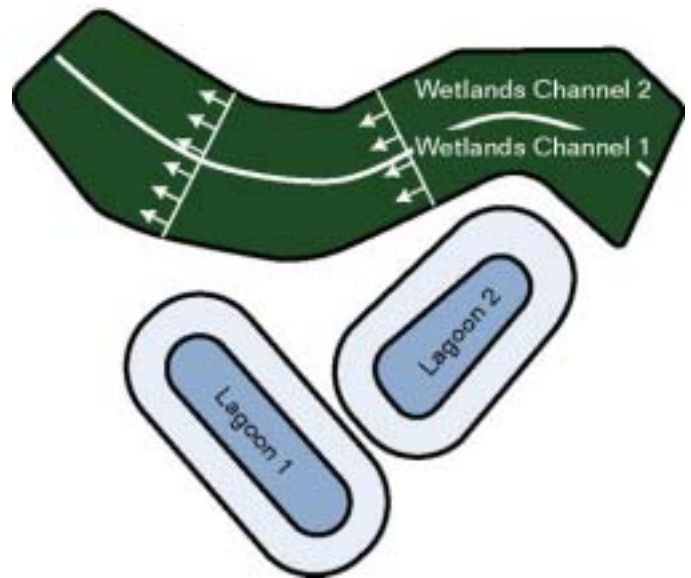
Energy Analysis

This system uses energy in its aerated lagoons. A lift station is provided after the headworks to convey the flow to the lagoons. The forebay to each wetland cell provides compressed air into the wastewater.

Wetland Design

Design Methods

The facility consists of a headworks with a bar screen, a Parshall flume, a grit channel, and an influent lift station followed by two aerated lagoons, a wetlands for polishing, and effluent Parshall flume, hypochlorination, a chlorine contact chamber, and dechlorination prior discharging to the Uncompahgre River. The wetland cells follow aerated lagoon #1 (volume = 2.09mg with a summer hrt of 5.8 days and a



winter hrt of 8.4 days), lagoon #2 (volume = 1.81 mg with a summer hrt of 5 days and a winter hrt of 7.2 days). The wetland cells have a summer hrt = 2 days and a winter hrt = 2.9 days.

Objectives

The primary treatment objective was the removal of TSS due to algal carryover from the lagoons.

Size

The constructed wetland consists of two 70' X 470' basins, with a maximum depth of 1.5'.

Shape

The wetland cells are contoured to fit the site topography. As shown in the schematic, the borders are curved.

Hydraulics

A swivel tee located in a manhole prior to discharge from the plant allows for variability in the water level in the wetland system. Flexibility in the system allows for cells to be bypassed and dried out. This proved to be an important feature when anoxic conditions became a problem in a wetland cell. Taking the cell offline allowed it to dry out and reaerate. In addition, drying out the cell resulted in muskrats leaving the site.

Treatment Goals

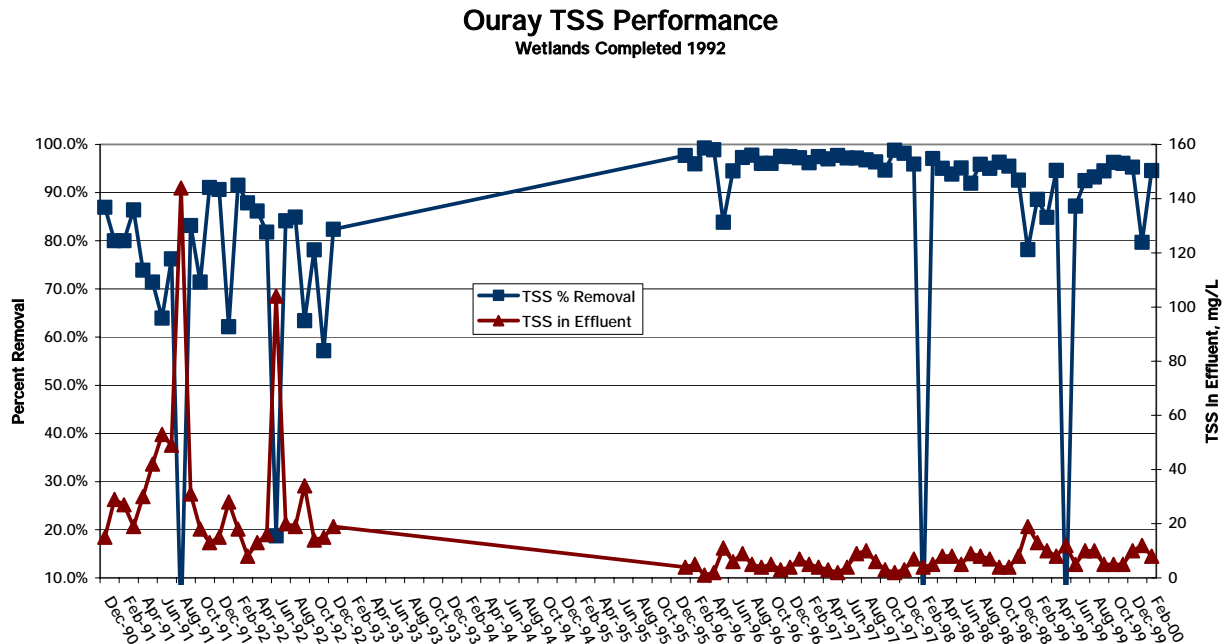
Permitted Discharge Limitations	
Oil and Grease:	10 mg/l (Daily Max)
CBOD ₅ :	25 mg/l (30-day ave)
BOD ₅ Removal:	85%
TSS:	30 mg/l (30-day ave)
PH, su (min – max)	6.5 – 9.0 (Daily Max)
Chlorine Residual:	0.5 mg/l (Daily Max)
Fecal Coliform Bacteria:	6,000 organisms per 100 ml (Daily Max)

Water Quality Data

Monthly discharge monitoring reports document the historical performance of the Ouray system. Treatment before and after the wetland implementation show a clear improvement in the system performance after the addition of the wetlands.

TSS Data

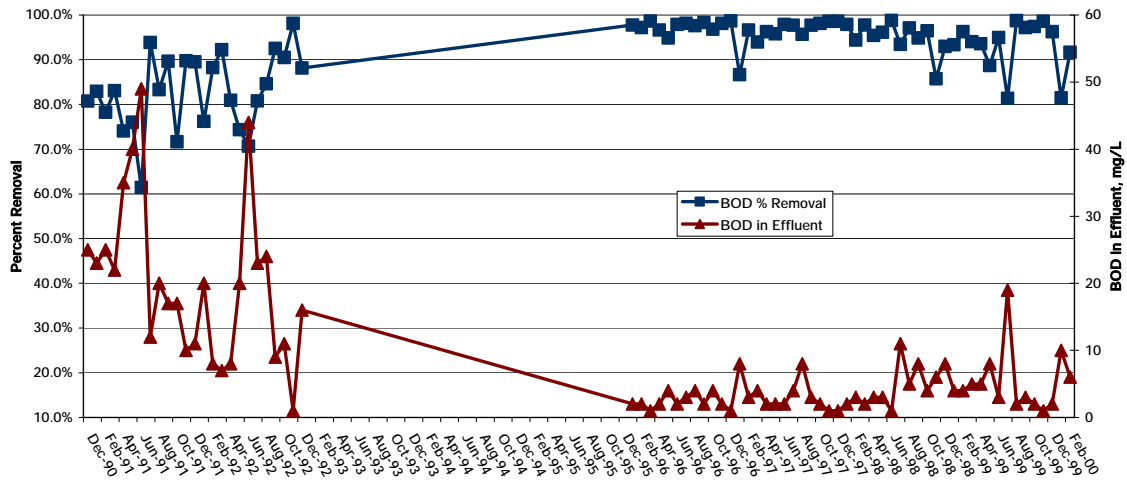
The TSS graph plots the percent removal on the left axis and TSS in mg/l in the effluent on the right axis. The average monthly TSS in the influent, since 1996, has been 139 mg/l and the average monthly effluent has been 7 mg/l. This clearly meets the permit discharge requirement of 30 mg/l.



BOD Data

The BOD data is plotted similarly to the TSS data, with mg/l in the effluent on the right axis, and percent removal on the left axis. . The average monthly influent amount has been 96 mg/l and the average monthly effluent amount has been 4 mg/l.

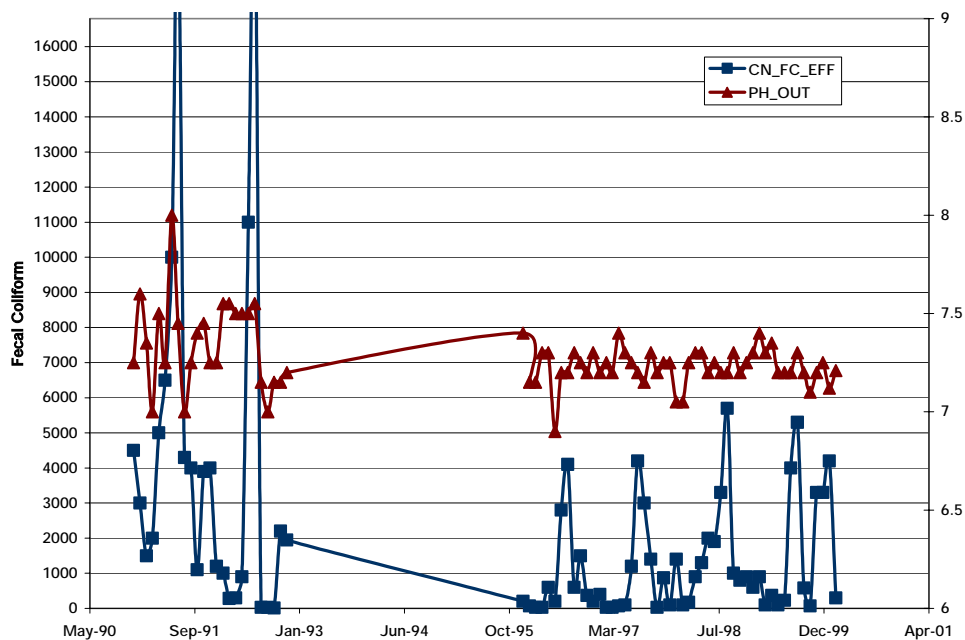
Ouray BOD Performance
Wetlands Completed 1992



pH and Fecal Coliform

Data for these two categories has been plotted on the same graph. Data reflect the quality of the effluent, not influent measurements are taken for these parameters. The pH values plotted are an average of the minimum

Ouray pH and FC in Effluent



The average fecal coliforms in the effluent has been 1300 organisms per 100 ml. This clearly meets the discharge permit requirements of 6,000 organisms per 100 ml.

General Ecological Setting

Situated at 7,760 feet, the constructed wetland is surrounded by the San Juan Range, the youngest and steepest range of the Rocky Mountains. Peaks surrounding Ouray rise 13,000 to 14,000 feet. Numerous aspen forests are found in the valley around Ouray, particularly in areas once heavily disturbed by mining, logging, and grazing. Vegetation communities along the Uncompahgre River include mixed conifer forests, piñon-juniper woodlands, mixed mountain shrublands, and western slope grasslands.

Cell Vegetation

Vegetation in all six cells is 80 to 90 percent cattail (*Typha* spp.) with the exception of cell 3, which is 80 percent duckweed (*Lemna minor*) and 20 percent cattail (*Typha latifolia*). Two small stands of phragmites or common reed (*Phragmites australis*) are present in cells 1 and 4. Other species present included curly dock (*Rumex crispus*) and lady's thumb (*Polygonum persicaria*).

Planting/Seeding

Cattails were planted in each cell.

Weeds

Phragmites is a large perennial rhizomatous grass frequently regarded as an aggressive, unwanted invader in the East and upper Midwest; however, in the western United States, phragmites can be regarded as a stable, natural component of a wetland community if the habitat is pristine and the population does not appear to be expanding. Many native populations of phragmites are “benign” and pose little or no threat to other species and should be left intact.

Maintenance Issues

The wetland system experiences an outside flow problem with sulfates, which concentrate in filters. The addition of aeration should mitigate this problem.

Wildlife

The constructed wetland in Ouray provides habitat muskrat, raccoon, rodents, waterfowl, and songbirds. Red winged blackbirds and mallard were observed during the site visit. The vegetative structural diversity and wildlife habitat value of the constructed wetland are moderate when isolated. At the landscape level, the constructed wetland does not add significantly to wildlife habitat found within the Uncompahgre River Valley.

Wetland Biodiversity Functional Assessment

Wildlife habitat rated moderate due primarily to the overall size or available habitat. Habitat diversity and uniqueness of the Ouray constructed wetland rated moderate and low. Total functional points were 52% of the total possible for this wetland, and it was rated as a category III wetland.

Wetland Biodiversity Functional Assessment.		
Function and Value Variables	Functional Points (0.1 to 1)	Possible Points
General Wildlife Habitat	0.5 (mod.)	1
General Fish/Aquatic Habitat	0.0	1
Production Export/Food Chain Support	0.7 (mod.)	1
Habitat Diversity	0.2 (low)	1
Uniqueness	0.2 (low)	1
Total Points	2.6 (52%)	5
Wetland Category (I, II, III, or IV)	III	

Human Use

The constructed wetland in Ouray is located along Highway 550 and has an informal associated pullout area. As parks and trails are developed in the valley, the wetland may be used for interpretive purposes. This wetland has high aesthetic value, and can be seen from the highway.

Overall Site Comments

This wetland has good vegetation cover and functions well in treating wastewater. It has wildlife and aesthetic value.